

Comparison of single crystals properties grown by two different methods : Flux and modified Bridgman methods

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Abstract

Lead zinc niobate $\text{Pb}(\text{Zn}_{1/3}\text{Nb}_{2/3})\text{O}_3$ (PZN) is known as a relaxor ferroelectric. It exhibits excellent dielectric and piezoelectric properties by combining the advantages of both the relaxor PZN and its solid solution with the normal ferroelectric PbTiO_3 (PT). With such an excellent performance, single crystals of PZN-PT are being considered as one of the most promising materials for next generation of electromechanical transducers in a broad range of advanced applications, such as medical ultrasound imaging and underwater communication. Relaxor-based piezoelectric $0.955\text{Pb}(\text{Zn}_{1/3}\text{Nb}_{2/3})\text{O}_3-0.045\text{PbTiO}_3$ (PZN-4.5PT) single crystals were grown by two methods (the Flux method and the Modified Bridgman method) from a flux of Pb_3O_4 in sealed platinum crucibles at about 1200°C . In this work, physico-chemical coefficients such as lattice parameters, thermal dilatation coefficients, melting points of crystals obtained from the two methods are compared. Besides, the dielectric and piezoelectric properties are also given. The crystallographic, dielectric and piezoelectric properties remained almost the same whatever the growth method.